DOCUMENT RESUME

ED 312 752 EA 021 401

AUTHOR Holloway, William H.
TITLE Of Bugs, Bytes, LANS and Viruses: The Changing Countenance of Computer Courses in Administrator Preparation Programs.
PUB DATE Mar 89
NOTE 13p.; Paper presented at the Annual Meeting of the International Association for Computing in Education (San Francisco, CA, March 1989).
PUB TYPE Speeches/Conference Papers (150) -- Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Administrator Education; *Administrator Effectiveness; Computer Literacy; Computers; *Computer Uses in Education; Curriculum Development; *Elementary Secondary Education; Futures (of Society); Higher Education; *Management Development

ABSTRACT

Instruction in computing over the past three decades has experienced dramatic changes in both method and substance. Beginning with on-the-job training, courses evolved to become highly sophisticated and widespread in education. The second decade, the 70's, focused on mainframe use, and the third decade on micros and widely networked systems. Gradually, the user has become more distant from the technical core; the coming decade may see the school administrator move physically further from the computer as skilled operators become more common. In addition, a selection of the literature that addresses accounts of what administrators "do" with computers as well as needed changes in computer training is reviewed. Estimates of developmental parameters are stated. The paper concludes with a report on changes that will soon be implemented in one midwestern university. (10 references) (SI)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED312752

Of Bugs, Bytes, LANS and Viruses: The Changing Countenance of Computer Courses in Administrator Preparation Programs

William H Holloway
University of Kansas

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

[X] This document has been reproduced as received from the person or organization originating it.

[ ] Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

William H. Holloway

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

A paper prepared for presentation at the annual meeting of the International Association for Computing in Education in San Francisco, California. No part of this paper may be reproduced by any means without the express permission of the author.

March 1989

EA 021 401

BEST COPY AVAILABLE

Of Bugs, Bytes, LANS and Viruses: The Changing Countenance of Computing Courses in Administrator Preparation Programs

The thesis of this paper is that those of us involved in computer training of school administrators are adrift in terms of preparation for the next decade to say nothing of the next century. It is asserted that computing courses in preparation programs are more determined by technological developments than by any informed vision of the evolving role or the nature and direction of professional practice.

Perhaps that is as it should be. Possibly any effort to envision the nature of future events is futile. If this is true, then no changes are necessary and course changes can continue to be most responsive to the rapid forward progress of technological development. On the other hand, there are some who would question the changes that occur and attempt to decipher the contributing factors. For at least a few, there is a belief that the future can be envisioned and purposive changes can be enacted that attend to factors that are reasoned. For example, perhaps course changes should be responsive to the evolving nature of practice. It is entirely possible that clues to future developments can be elicited either from an examination of historical events or from the writings of recognized authorities.

This paper is somewhat more than a speculative perspective However, hard empirical evidence is not rampant That is, the paper will attempt to examine and characterize the nature of training in computers over the last three decades. The historical analysis is admittedly a self-report, case study with $n = 1$. In addition, a selection of the extant literature which addresses accounts of what administrators "do" with computers and papers which attempt to examine needed changes in computer training will be reviewed for possible direction. From the two primary sources of information some estimates of developmental parameters will be stated. The paper concludes with a report of changes that will soon be implemented in one mid-western university.

The reader will be left to make their own assessment of the validity of the recommendations for change and to pass judgement on the proposed changes for one such program. The underlying assumption is, of course, that future scenarios can be envisioned and brought into being.

Close Encounters of the First Kind (Bugs in the 1960's)

Three early recollections come quickly to mind. First, the purchase of a "mini-computer" for a high school mathematics program (c. 1963). The device consisted of a large tangle of wires and a master board on which various circuits could be defined representing logic patterns. The logic

patterns were designed to accomplish simple arithmetic tasks and often logic errors or "bugs" were profuse. De-bugging such programming efforts required as much or more time and effort as initially planning and implementing the programs. The so-called bugs were characteristic of the trial and error approaches to early computer experiences. Still, appetites grew, imaginations of what might be knew few limits, and on-the-job training was the only open avenue

The second recollection is that of a small suburban school district (enrollment of about 4000) and a decision to purchase and install an IBM Unit Record System (c.1965). The system consisted of a Sorter, a Keypunch, an Interpreter, a Gang Punch, and the 1400 series accounting machine. The system required air conditioning, a non-static carpet, and one whole room in order to replace one NCR accounting machine. The system change is related to the foregoing recollection in that the wiring of panels to accomplish work was still a necessity. Hence, many bugs were encountered in the course of designing and wiring boards to accomplish accounting, grade reporting, and other applications. However, the bright side of the coin was that once the boards were debugged - the application was reliable until additional program changes were needed. Also, the vast experience with the so-called "mini-computer" resulted in the author being appointed as Director of Data Processing. Humorous in retrospect but a serious matter at the time. Clearly, more on-the-job training was on the horizon.

The third recollection is that of becoming an evening adult education teacher of data processing (c. 1966). In this role, several early IBM manuals were used as course texts. The substance of the course was history of computer developments (as constructed by IBM), computer concepts, coding schemes, and keypunching. The assignment, on reflection, was both enjoyable (the first experience teaching adults) and successful as keypunch skills were in considerable demand. Bugs still occured as the system had no provision for a verifier. Further, it is interesting to note that the IBM historical conception of developments remains relatively unchanged yet today with the exception of additions.

The foregoing recollections serve to illustrate how one school administrator began a career closely tied to computing and computer training. The essence of the "close encounters of the first kind" is that of on-the-job training, trial and error learning, and the freedom to make errors (bugs) so long as one was sufficiently responsible to attempt to correct such problems. Formal courses were almost unheard of though it soon became clear that training would be necessary since computers were there to stay. Thus, without undue harm it appears there is a basis for characterizing the 60's decade as on-the-job training.

Close Encounters of the Second Kind (Bytes in the 1970's)

Toward the end of the 1960's decade the school district was ready to upgrade and invest in a "real" computer. Surrounding school districts limited in number, had moved into IBM 1400 and 1620 computers and the pattern of constant upgrading was becoming clear, service agencies and lease arrangements notwithstanding.

The small suburban district whose enrollment had now grown to nearly 5000 was still too small to afford the price of "hand-me-down" computers. Hence, one of the early school district coalitions was formed and located at an Intermediate School District office. The latter organization in Michigan is the counterpart of a New York BOCES or a Cooperative Educational Service Center in the midwest. The new cooperative hired a Director/Operator and placed an order for an IBM 1400 system complete with keypunch, computer and magnetic tape unit.

The technological change brought about several concomitant changes. Among these were a distancing of the technical core from participating district administrators and hence a change in the role of what had been district data processing directors. For example, the role required more coordination/facilitation and instructional courses related to computing had to find ways to deal with the new physical distance. In brief, the focus became more addressed to input/output issues than to processing. Too, the first instance of a "non-educator" administrator was experienced. However, for the enterprising local district administrator there were still opportunities to learn.

The author, for example, contrived to be sent to IBM's Executive School in Endicott, New York (c.1970). In addition, any opportunity to sit next to the new Director in the course of applications programming was seized upon and a knowledge of the Autocoder language began to accumulate. In this period, formal coursework was becoming increasingly available. However, learning was still more dependent on self-taught and tutorial approaches. In addition, the period was characterized by the need to understand bytes and memory storage in terms of four-character operating codes and address schemes.

In the early to middle 1970's, change and obsolescence became real concerns. The author was admitted to doctoral study where every opportunity to pursue computer coursework or gain experience with computers was exercised. Operating systems which began with the IBM 1600 series drastically altered the nature of programming. FORTRAN was the accepted language though BASIC was growing in popularity, and the operating systems which used random access and storage concepts impacted the nature of courses once again. An IBM system 30 was available for

"hands-on" operation and the university owned a CDC 6600 mainframe for administrative and academic work.

Following graduate study, a position in higher education was sought and acquired. A principal reason for employment was the growing experience with computing and the expectation that colleges and schools of education would soon need to add computer coursework. In the Fall of 1972, a first course in computing was offered. The course has since been offered for seventeen straight years. The nature of that course at its inception reflected the times. That is, mainframe computers with terminals and keypunch entry to the Honeywell 600 series computer. Hence, keypunching, terminal entry, magnetic tape storage, and the use of a growing library of stored programs dominated. However, history of development, fundamental concepts, BASIC programming, and other topics were evident in the instruction. The course for educators was a first in the state and in the midwest region.

Course interest grew quickly and prevailed in the remainder of the decade. Bytes and bits constituted a basic unit for instruction. Courses at surrounding institutions of higher education in the region emerged as former students were employed to initiate such work. A majority of other students entered administrative posts in the area schools or continued teaching. Hence, administrative and instructional uses increased throughout the latter half of the decade and similar competing courses emerged in other areas of the School of Education. For example, special education and the curriculum and instruction departments soon offered computing instruction. As an example of course change that was reluctantly accepted, the use of punched card and tape entry and the array of bits and bytes passed into obsolescence as terminal entry became the exclusive mode of transmission. The computer training of educational professionals had become a steady business and course changes which were most responsive to technological developments became a hallmark of the decade.

Close Encounters of the Third Kind (LANS in the 1980's)

As the decade of the 1980's arrived even more dramatic changes were in store for instruction in computing, The microcomputer appeared on the market and the public schools and other educational institutions found they could afford to own the latest of technological miracles. No longer was it necessary for educators to work with systems that were 10-15 years behind developments. Johns-Hopkins University (and many others) began a series of periodic surveys to depict the growth of computers in education and the kinds of uses for which computers were employed. In the mid-west region, it became clear that there would soon be a microcomputer for every 15-20 students in any given school district. Small school districts could

now manage their own computing and the need for software was such that software companies blossomed. One early Apple catalog was some 300 pages in length and offered an array of nearly 10,000 programs.

Course changes and instructional changes became absolute requirements. In the present case, instruction was initially dependent on three Apple computers with 32K capacity (c. 1982). Eventually, a teaching lab with 12 computers was acquired (c. 1985) and now there is a lab with 12 Macintosh computers complete with hard disks and networked printers. Mainframe computers and micos have achieved a "peaceful coexistence" as local area networks (LANS) and telecommunications provided all manner of near and distant connections.

The systems changes resulted in a host of course changes. The emphasis on BASIC and custom programming has all but disappeared for educators due to a plentiful supply of high quality software at affordable prices. Software exploration and utilization have largely replaced the need for programming by educators. There is also evidence of a decline in the emphasis on fundamental concepts as systems become more "user-friendly" and the user is further removed from the need for extensive technical knowledge. Word processing, spreadsheet/database applications, statistical analysis, authoring systems, graphics packages, and a variety of lesser programs have become the central focus of instruction in administrative computing. One colleague has suggested, "that there is no longer a need for instruction in computing any more that we would attempt to teach typing" To some extent this is true as the public schools are increasingly commited to computer literacy instruction and the undergraduate program in teacher preparation also invests no little amount of time in computing.

As the decade comes to a close, significant security problems have been experienced across the nation and a small number of users have encountered first-hand the problem of "computer viruses". The computer virus in direct contrast to the unauthorized entry problem is destructive of existing files and programs. The immediate effect was to make computer dependent workers and activities extremely cautious of any programs entered into the system. The experience, however, was enough to give pause and thought to what the next decade might hold in store.

In summary, instruction in computing over the past three decades has experienced dramatic change in both method and substance. Beginning with on-the-job training, courses have evolved to become highly sophisticated and widespread in education. The second decade focused on mainframe use and the third on micros and widely networked systems. Gradually, the user has become more distant from the technical core and the coming decade may see the school administrator move physically further from the computer as skilled operators become more common.

Guidance from the Recent Literature

While not all published reports are empirically based, there are two broad classes that may be of some guidance. The first is course oriented accounts of "what works" or "what is contemplated". Articles such as those by Rubincam (1987), Bosch (1988), and Spuck and Bozeman (1988) are prime examples. The second group are generally data based accounts of "what is" with respect to administrative computing. This group of articles includes those similar to Visscher (1988), Huntington (1983), Naron and Estes (1986), the Johns-Hopkins periodic studies and others.

Schwartz, et al, (1989) acknowledge the current state of developments which is at best disconcerting:

> "When computers began to appear one or two at a time in the occassional classroom, some of those at the electronic frontier of education advanced visions of a new age, when every student might be individually taught by a machine more responsive, more perfectly reliable than any teacher. Technology, some wanted to believe, was about to solve the intractable problems of American public schooling. Others objected that better understanding of how children learn, not better technological inventions, would lead to educational improvements. Today, although computers are found in many classrooms, they are often poorly integrated into classroom instruction, and many sit idle."

Several concerns emerge from the foregoing assessment. That is, computers are poorly integrated into the curriculum and it is possible that we have already reached the point (instruction only perhaps) where computers like the audio recorders of several decades ago are not being used to the extent first imagined.

All (1986), for example, states:

> "Even though instructional leadership is named as the primary responsibility of principals and there is a current focus on student achievement and accountability of programs, little is being done with instructional applications in any of the thirty buildings either in the area of analyzing test data or in computer-managed instruction."

All studied the microcomputer uses of thirty selected school administrators who were admitted users of computers. What she found with respect to administrative uses is even more alarming.

> "There is a sizable discrepancy between the potential administrative applications that are confirmed in the literature and the actual use by the selected principals in Kansas. With the exception of word processing ans some student applications, frequencies of use were low or virtually non-existent."

What seems clear is that actual use in the field by practitioners is dramatically different from what is taught in postsecondary classes. What is the implication of such discrepancies? How are the differences to be reconciled? One should not ask a student what they need to know. However, observing what the same students do after instruction ought to have some bearing on what is taught and for what purpose.

Naron and Estes (1986) studied sixteen public schools and nine postsecondary institutions using a survey approach. They report a wide range of computer useage but an average use of from 10-25%. Also, average use by students was only about 20 minutes per week. Of even greater concern, they report no new applications. That is, accounting for personnel, fiscal and material resources and grade reporting, scheduling, and score analysis are typical uses in addition to word processing.

A study by Spuck and Bozeman (1988) echos agreement with the foregoing. The authors used a survey approach with 80 universities in the U. S. who had doctoral programs in educational administration. They found that the heavy emphasis of instruction was on such applications as data base management, spreadsheets, word processing, budgeting/accounting, student scheduling, schedule planning, statistical analysis, telecommunications, followed by moderate interest in graphics, CMI, and CAI. Course authoring and instructional applications were not assessed

In general, the somewhat meager results are in relatively close agreement. That is, what we believe we teach in computer courses is far greater than what is used. What is used is only a small subset of the applications that are available. Little attention is given to instructional uses of computers.

Quite in contrast, two studies that have no empirical basis, still act rather arbitrarily to define what the nature of instruction for school administrators should be. Spuck and Atkinson (1983) provide a long list of potential applications and suggest instruction ought to incorporate the topics. Bosch (1988) sets forth a model for computer courses for educational administrators that is not totally unlike the Spuck and Atkinson approach. Many of the familiar topics will be found under headings that are labelled conceptual, proficiencies, and applications components. However, the problem is that the model is formulated without any obvious guidance from what practitioners do, long-term trends in technological development, or from research. How can such efforts be viewed with any degree of credibility?

In summary, most changes in the nature and manner of computer instruction have been responsive to technological changes. Practicing administrators actually do far less than they were taught and far less than could be done given the available hardware and software. Actual useage has begun to evolve around the use of a set number of established applications

programs. These include word processing, spreadsheets, data base management, graphics, and statistical analysis. The public schools have developed a considerable investment in introductory computer courses (some quite advanced) and undergraduate teacher education programs are beginning to incorporate computer courses directed toward instruction. What, then, are the implications for computer courses for educational administrators?

A Proposed Strategy

In the educational administration program at a mid-western university, the masters level program leading to building level certification has been under review for the better part of a year. Many recommended changes are in the process of being fully developed and the doctoral program will receive equal treatment in the near future.

The recommended changes that are emerging are predicated on a serious review of contextual changes. For example, the increasing attention given to the role of instructional leader, the liklihood that some form of site -based management will emerge, and the increased concern for improved effectiveness and outcomes-based accountability. It now appears that the "management" aspect of the building principal role will decline, increased attention will need to be given to instructional improvement, and the principal will need to become even more efficient in the use of their time - a part of which will be re-directed to instruction.

In addition, the technological developments on the horizon do not appear to be of a nature that administrative duties will be dramatically changed. For example, microcomputers will become faster, have greater memory and storage capacity, will be more transportable, and will be networked. Telecommunications advances will significantly affect instruction in the form of distance learning, however, this is not considered to have influence on the managerial tasks nor how they are accomplished. Software for general administrative use has reached a plateau. That is, the various kinds now available (word processing, spreadsheets, etc.) are quite adequate and new conceptions do not appear to be lacking. Hence, at best near-future developments may be even more user-friendly, faster, and have a few new bells and whistles added. What is not expected is entirely new applications that affect administrative duties.

Finally, in addition to the reproportioning of attention in the masters level program to accomodate new or enlarged areas, there are the computer courses that are emerging in other programs of professional preparation. Clearly, there appears to be less reason for a heavy investment in introductory activities such as was the case as little as five years ago. Too, if students have been introduced to some programs (on a Macintosh, for

example) the introduction of other programs is considerably easier. Is it even safe to assume that administrators will continue to do their own computing?

In response to the foregoing questions and attempting to take into consideration the anticipated changes and trends, the program review effort planned some dramatic (hopefully, well informed) changes. Among the many changes, a traditional course was significantly altered and one new course was developed. The course that was redesigned was the introductory finance course. The course that was newly conceptualized is best described as "Administrative Inquiry". The simplest way to envision what changes are recommended is to review what traditionally was incorporated in most computer courses and how the areas will be redistributed or discarded.

1. Little if any attention will now be given to history of computing.

2. No attention has been or will be given to languages or to programming.

3. No attention will be given to underlying or fundamental computing concepts.

4. Little, if any, attention will be given to word processing. However, the skill will be assumed.

5. Considerable attention will still be given to spreadsheets and data base management. However, applications exploration and problem solving will be incorporated in the introductory finance course and to some extent in the new course.

6. Considerable attention will be given to the use of statistical analysis programs. However, the use of this tool will occur predominantly in the Administrative Inquiry Course.

7. Some attention will be given to instructional computing. However, this component will be shifted to courses on instructional planning and curriculum leadership.

8. The current course on Administrative Computing will be phased out to make room for other needs.

In summary, based on our collective view of developments and needs there is little further reason to expend 8-10% of the administrator preparation program on computing. An introductory skill level will be assumed. Those continuing needs for operational knowledge will be redistributed into other courses. Considerable growth in administrator computing is anticipated. However, present practice would need to increase significantly to justify more than the attention given above in the new configuration. Too, one cannot lightly dismiss the probable effects of other training and teaching experience that is likely to precede study in school administration. It is always possible, of course, that new technology will be developed that will require consideration. It is the intent of this program to examine such new developments on a case by case basis. Perhaps, answers to such advances can be arranged through less enduring course experiences.

References

All, Patricia (1986). An Exploratory Study Of Microcomputer Useage By Selected Building-Level Administrators in Kansas. University of Kansas doctoral dissertation in Educational Administration.

Bosch, K. (1988) A microcomputer literacy training model for school administrators. Journal of Research on Computing in Education, 20(4), pp. 331-38.

Naron, N. and Estes, N. (1986). Technology in the schools: Trends and policies. AEDS Journal, 19(4), pp. 31-43.

Rubincam, I. (1987). A taxonomy of topics in computer applications to education based upon frequently cited books, articles and reports. Journal of Research on Computing in Education, 20(2), pp. 165-87.

Schwartz, J., Weir, S. and the Laboratory for Human Cognition (1989). Symposium: Visions for the use of computers in classroom instruction. Harvard Educational Review, 59(1), pp. 50-86.

Spunk, D. and Atkinson, G. (1983). Administrative uses of the microcomputer. AEDS Journal, 17(1&2), pp. 83-90.

Spunk, D. and Bozeman, W. (1988). Training school administrators in computer use. Journal of Research on Computing in Education, 21(2), pp. 229-39.

Summers, E. (1985). Microcomputers as a new technological innovation in education: Growth of the related literature. Educational Technology, 25, pp. 5-14.

Visscher, A. (1988). The computer as an administrative tool. Problems and impacts. Journal of Research on Computing in Education, 21(1), pp. 28-35.